Influence of Planting Materials and Land Tenure System on Mango Production in Endo Ward, Elgeyo Marakwet County, Kenya

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Abstract

Mango (Mangifera indica L.) is Kenya's third most important fruit in terms of acreage and total production. Mango is grown in Coastal, Eastern, and Central and in Rift valley dominantly in Kerio Valley belt due to favourable environmental conditions. Recent research, however, has reported a decline in mango production in Endo Ward. Therefore, the objective of this study was to determine the factors that affect smallholder mango production in Endo Ward, Elgeyo Marakwet County. A survey was carried out in which a sample population of 281 farmers were chosen from a target population of 937 farmers. A simple random sampling technique was used in selecting the locations and the respondents. Primary data was obtained using questionnaires and interview on key informants. Data collected was analysed using descriptive and inferential statistics. The results indicated that 42.96% of planting materials are obtained by farmers from local private nurseries while 23.47% get from Kerio Valley Development Authority (KVDA) nurseries. Thus, the high cost deterred some farmers from accessing mango planting materials easily hence decline in production. Results also showed that the land tenure system was such that 89.53% of the farmers owned land communally while only 10.47 % owned individual land. This lack of property rights on Land resource did not motivate farmers sufficiently enough to invest optimally in mango production. This study recommends that there is need to assist the farmers to access affordably planting materials and grant tittle deeds to farmers to motivate optimum individual effort.

Keywords: Mango Production, Planting Material, Land tenure, Endo ward

INTRODUCTION

India is the world largest producer of mango followed by followed by China, Thailand and Mexico. In Africa, Egypt is the largest producer of mango and it is followed by Nigeria (Atlas, 2023). Kenya is in the ninth position (FAOSTAT 2007, Mulinge 2015) and the fruit has been cultivated in the Coast Province for centuries.

Mango production in Kenya is predominantly a smallholder crop in the semi-arid areas, often produced at subsistence level with minimum inputs in terms of crop management (Nyambo et al., 2006). Mango orchards are normally small, not exceeding five hectares of land this therefore has influence on quantity produced (Nyambo et al., 2006, Muthini, 2015). Eastern and Coast regions of Kenya are the major producers of Mango followed by central as well as Nyanza, Rift valley North and Western regions (HCDA, 2012).

Most mangoes produced are consumed within the same production area or sold in local urban markets which result to high wastage due to surplus in the market and perishability of the same (FAO, 2005). Mangoes produced in Elgeyo Marakwet are sold in the nearby towns of Eldoret, Nakuru, Kisumu, Iten and Kitale.

Mango production in Kerio Valley has been reported to be on a declining trend (Griesbatch, 2003; Mulinge, 2015) despite suitable conditions for mango production. Several factors have been found to affect mango production and that household size, farming income, farm size, and amount of credit, and extension contacts which exhibited positively affected on mango output, whereas cost of pesticides and manure had negatively affected (Isaboke et al., 2022). Besides, planting materials and land tenure system have been found to effect on mango production.

According to (HCDA, 2010) most smallholder farms experience limited access to good quality planting materials. There is a general shortage of Mango planting materials of improved and higher yielding varieties in many areas. Farmers often use inferior seedlings obtained by germinating mango seeds from indigenous varieties. Such non grafted trees take much longer to bear fruit. Whereas grafted trees begin to bear fruit within 3 to 4 years, non-grafted trees will take at least 5 years to bear fruit, depending on the growing conditions. Indeed, Dessalegn et al. (2014) found out that most of the farmers had both grafted and non-grafted mango (54.3%) grafted mango (28.6 %) and non-grafted mango trees in their farm (17.1%).

According to Mulinge (2015), majority of smallholder Matinyani Sub-county farmers lack clean planting materials. With respect to the source of planting materials, most farmers sourced planting materials from neighbors (37.7%), and own farms (10.4%) and others sourced planting materials from groups that had mango nurseries, as well as from KARI and Ministry of Agriculture (MOA) (Mulinge,2015). A few consumers and potential growers are familiar with the characteristics of the many different cultivars of mango that are now grown and available in the country (Griesbach, 2003). Income from the sale of grafted mangoes fruits was much higher that from the sale of local mangoes (Mulinge, 2015).

Land is a factor of production and that the chapter five of Constitution of Kenya, 2010 emphasized that land should be utilized in an equitable, efficient, productive and sustainable manner. The constitution further classified the land into public land, community land, private land and leasehold tenure (Republic of Kenya, 2010). The existing land tenure system, land security, legal issues and real estate developers posed challenges to farmers in accessing land for agricultural production (Micah et al., 2016). Land tenure system impacts long term investment in projects such as tree planting, despite having no effect on the crop productivity (Place et al., 2002). Indeed, land tenure system influences the demand for agricultural extension service (Gido et al., 2015) and enhanced household access to credit (Do et al., 2008). On the contrary, having a land title deed is not a guaranteed to access to loan (Musembi et al., 2007). Therefore, the objectives of this study were to determine the influence of planting materials and land tenure system on mango production in Endo Ward, Elgeyo Marakwet County, Kenya.

METHODOLOGY

Area of study

The study was done in Endo Ward, Marakwet East Sub-County in Elgeyo Marakwet County (Fig. 1). The Marakwet community lives in Elgeyo Marakwet County, which covers a total area of square 3029.9 km. It extends from latitude 00 20’ to 00 to 30’ North and Longitude 350 0’ to 350 45’ East. It borders West Pokot County to the North and Baringo County to the East (Kimaiyo, 2015). The escarpment and the Kerio Valley receive rainfall ranging between 1000mm to 1400mm per annum. Marakwet East has the lowest with 109 persons per km2. (Open County, 2023)

The farmers grow drought resistant crops like fruits, millet, sorghum, groundnuts and green grams and keep animals like zebu cattle, goats, sheep and poultry. The smallholder farmers operate on piece of land on average of 1.36 ha (GoK, 2013).

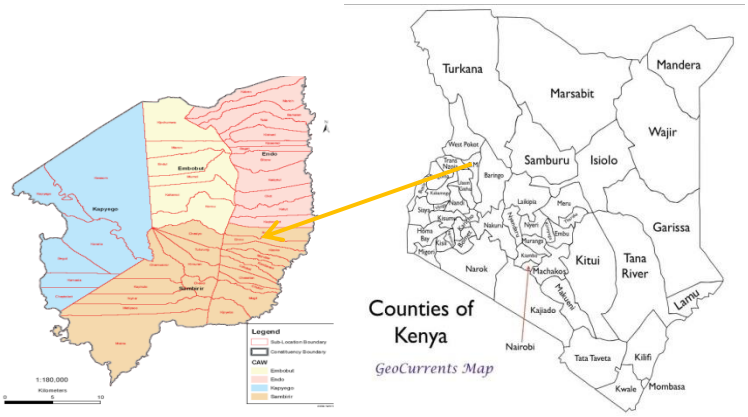

Figure 1: Map of Kenya and Endo ward
Source: *Centre for Economic Governance (2023)*

Research Design
The study applied descriptive research design. This was suitable to the study as it enabled the researcher to describe, analyze and interpret phenomena or situations without changing the environment of the study. It was also found to be cost effective when interview schedule was used to collect the data (Kothari, 2004). It constituted blue print for collection, measurement and analysis of the data.

Target Population
The target population in a research study comprises all those potential participants that could make up a study group (Kothari, 2004). A total of 937 mango farmers were targeted for the study. The number of mango farmers thereof was obtained from the Ministry of Agriculture in the Elgeyo Marakwet county office.

Sample size
Sample is the subgroup of the population (Lind et al., 2008). A sample size of between 10-50% is allowed in a descriptive research, (Mugenda & Mugenda, 2003). Thus, in this study, sample sizes of 281 mango farmers was selected from the area. Sampling means selecting a given number of subjects from a defined population as representative of that population. Any statements made about the sample should also be true of the population (Orodho, 2002).

The researcher used purposive sampling technique in selecting Endo ward which is the mango growing zone in Elgeyo Marakwet County. Endo wards has ten locations namely, Mokora, Endo, Kaben, Koibirir, Kibiriem, Ketut, Murkutwo, Talai, Sibow and Chechan. Out of 10 locations thereof Mokora, Endo, Kaben, Koibirir, Kibiriem, Ketut, Murkutwo and Talai location were chosen via simple random sampling technique for the study. A simple random sampling was also used in selecting the smallholder mango farmers who were the interviewed and given questionnaires to fill in.

Data Collection Instruments
Primary data was collected using structured questionnaires. The questionnaires were considered appropriate as research tools for the study because of less time required in the collection of data as compared to carrying out direct interviews. Questionnaires with both open and closed ended questions was administered to the respondents who are smallholder farmers using the drop and pick method. For those who could not read and write they were interviewed by the enumerators to solicit more information on factors that influence mango

production in Endo Ward, Marakwet East Sub-County, Elgeyo Marakwet county. Secondary data was collected from journals, magazines and annual reports from Government offices.

Data analysis

Data collected was analysed using descriptive and inferential statistics with the help of Statistical Package for the Social Sciences (SPSS).

RESULTS

Table 1: Source of planting material by smallholder mango farmers in Endo ward

Source of planting material	Frequency	Percent	Cumulative Percent
Donations from County Governments	34	12.27	12.27
Local private tree nursery	119	42.96	55.23
KVDA Nurseries	65	23.47	78.70
Seedlings from own farm	59	21.30	100.0
Total	277	10 0.0	

Source: Author's primary data, 2020

The results indicated that 42.96% of planting materials are obtained by farmers from local private nurseries while 23.47% get from Kerio Valley Development Authority (KVDA) nurseries. Thus, the high cost deterred some farmers from accessing mango planting materials easily hence decline in production (Table 1).

Table 2: Comparative analysis of yield of grafted and local varieties of mangoes

	Grafted and local	N	Mean	Std. Deviation	Std. Error Mean
Total Yields (Kgs)	Yes	227	980,2952	244,27365	16,21301
	No	50	448,1600	126,46018	17,88417

P<0.05

Source: Author's primary data, 2020

From the above table it is observed that there was significant difference in yield between the grafted and local varieties of mango at 95% confidence level (Table 2). This means that the grafted varieties of mangoes produced higher yield than the local varieties.

Table 3: Classification of land tenure system

		Frequency	Percent	Cumulative Percent
Communal privately owned	Yes	248	89.53	59.2
	No	29	10.47	100.0
	Total	**277**	**100.0**	

Source: Author's primary data, 2020

Results also showed that the land policy and tenure was such that 89.53% of the farmers owned land communally while only 10.47 % owned individual land. This lack of property rights on Land resource did not motivate farmers sufficiently enough to invest optimally in mango production (Table 3), 34.66% of the respondents agreed that land ownership affected long term production of mango, 31.41% of them strongly agreed, 13.72% disagreed, 6.50% strongly disagreed and 13.72% were not sure that land ownership affects long term production of mango production (Table 4).

Table 4: Does the type of land ownership make people not to invest in long term projects like mango production?

Reaction of respondents	Frequency	Percent	Cumulative Percent
Agree	96	34.66	34.66
Strongly agree	87	31.41	66.06
Disagree	38	13.72	79.78
Strongly Disagree	18	6.50	86.28
Not sure	38	13.72	100.0
Total	**277**	**100.0**	

Source: Author's primary data, 2020

DISCUSSION

According to the findings in Table 1, respondents indicated further that majority of the seedlings were from private tree nurseries (42.96%). This means that Mango farming is a lucrative venture making seedlings dealers to venture into due to availability of mango producers. Private sector plays a significant role in the providing the reliable and adapted seedlings to the mango farmers. Respondents further indicated that they bought mango seedlings from Kerio Valley Development Authority (KVDA) (23.47%). KVDA is a government agency which promotes mango production in the area of the study in view of maximizing mango production to achieve food security (KVDA, 2023). It was also noted that there are farmers who develop seedlings from their own farms (21.30 %). This means that most farmers make their own planting as opposed to what is from outside. The results indicate that 12.27% of the seedlings were from donations from local leaders and County government. Availability of mango seedlings is very important as per mango production is concerned. In Kenya, agriculture is a develop function and that the county government through the Ministry of agriculture promotes the growing of mangoes through availing seedlings and extension services to farmers (County Government of Elgeyo Marakwet, 2022).

It was noted that majority of the respondents representing have adopted grafted mango seedlings for the improvement of mango production in Endo ward. This is because grafted mangoes are high yielding and resistant to pests and diseases. In line with this, mango trees propagated by seed are not true to type, may be susceptible to diseases and pests, low yielder, and poor in quality attributes (Dessalegn et al., 2014). The low adoption of grafted seedlings can be due to the fact that grafted seedlings were expensive and thus the farmers go in for local mango breeds which are readily available such as Kent and Ngowe seedlings which grow everywhere. This affect mango production in Endo ward leading to decline in production because the local varieties do not fetch high market prices as compared to the exotic ones. This is applauded by studies done by Okoth et al. (2013) that apple variety is highly preferred because of its high vitamin C content. The results from Student T test showed that there was significant difference between the means of grafted and local varieties at 95 % confidence level. This means that higher yields were obtained from the grafted ones (Table 2).

Most of the land was owned communally (89.53%), whereas 10.47% of the respondents are those who bought land from specific clans and thus own such parcels of land privately. This means that any development on the land will be on the whims of the clan elders (Table 3). Most of the respondents agreed that land ownership affected long term production of mango (Table 4). This has affected mango production since development of land development cannot occur if the farm is owned communally, this is because many members of the clan

will shy away and when a member decides to develop the land you see them complaining yet it was an idle land. This has resulted to low income as evidenced by studies done by Oduol et al. (2017) that decline in farm income was due to inadequate information on land adjudication and registration. If these people could register the land then land ownership and use could be simple hence easy to develop.

CONCLUSION AND RECOMMENDATIONS

The study was aimed at determining the influence of planting materials and land tenure system on mango production in Endo Ward. The mango farmers sourced their planting materials from local private tree nurseries in the region. They attributed low production of mango in the region to poor planting materials. Besides, the farmers had adopted the grafted mango seedlings which produced higher yields compared to the local varieties and differed significantly at 5%. Mango production was done along the valley in which land was mostly communally owned. Communal land ownership affected long term investment such as mango production in the area.

This study also recommends that since grafted mango have higher yield than local variety, there is need for County Government to assist farmers to acquire such seedlings at a subsidized price, or buy for them as one way of encouraging agriculture in such places through mango production. Furthermore, since communal land affected mango production it is recommended that land subdivision and registration into private land be done to ensure proper management of mangoes to guarantee food security as well as increase in income of the farmers. This study recommends that there is need to assist the farmers to access affordably planting materials and grant tittle deeds to farmers to motivate optimum individual effort.

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